

DETAILED ACTION

Claim Rejections - 35 USC § 112

1. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

2. Claims 42-45 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 42 recites the subject matter of a second dimension on a second surface (or side) of the first insulating layer, but fails to clarify the relationship between the recited tapered opening and the recited second dimension. It is not clear which feature the recited second dimension is definitely referred to.

Claim 43 recites the limitation "the opening of the silicon oxide mask layer" in the claim. There is insufficient antecedent basis for either of such opening or such mask layer as recited in the limitation in the claim.

Claim Rejections - 35 USC § 102

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

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4. Claims 33-36, 42, 44 and 45 are rejected under 35 U.S.C. 102(a) as being anticipated by Koga (US 6,177,331).

Koga discloses a semiconductor structure (Figs. 1a-1e), comprising:

a trench formed in a substrate (101);

a first layer of a silicon nitride (110 or 103) formed over the substrate, having a opening (tapered and/or faceted) formed therethrough over the trench, the opening having a first dimension along the lower surface of the first layer and a second dimension along the upper surface of the first layer, wherein the first dimension is smaller than the second dimension and substantially equal the width of the underlying trench; and,

an insulating layer (112; silicon oxide) formed on the first layer and extending into the opening and the trench.

Regarding claim 34, the materials of the substrate and the silicon nitride layer (64) can naturally be selectively etched with respect to one another

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. Claims 25, 26, 28 and 43, insofar as being in compliance with 35 U.S.C. 112, are rejected under 35 U.S.C. 103(a) as being unpatentable over Koga (US 6,177,331) in

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view of Witek (Witek et al., US 6,146,970) and/or Noguchi (Noguchi et al., US 2001/0030367).

Koga discloses a semiconductor structure (Figs. 3a-3d), comprising:

a trench formed in a substrate (101);

a first layer (105 or 108) formed over the substrate, having a tapered opening (or faceted) formed therethrough over the trench, the opening having a first dimension on a first surface of the first layer adjacent to the trench and a second dimension on a second surface of the first layer opposite to the first surface, wherein the first dimension is smaller than the second dimension and substantially equal the width of the underlying trench; and,

a mask layer (106) formed over the first layer, the mask layer having an opening therethrough positioned over the tapered opening and having a dimension less than the second dimension of the tapered opening of the silicon nitride layer (64),

Koga does not expressly disclose that the materials for the first layer and the mask layer can be switched so that the first layer can be formed of silicon nitride and/or that the mask layer can be formed of silicon oxide.

However, one of ordinary skill in the art would readily recognize that the first layer (105 or 108) in Koga functions as an etching stopper layer underlying the mask layer (106; particularly see Fig. 3b); that it is art-known that silicon oxide layer and silicon nitride layer are commonly used as a mask layer and an etching stopper layer in either orders because of their well known etching selectivity between the them in either dry and wet etchings, as readily evidenced in Witek (see col. 8, lines 43-46); and/or that

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silicon nitride layer is also commonly used as an etching stopper layer underlying a silicon oxide mask layer, as evidenced in Noguchi (see the silicon oxide mask layer 39 and the underlying silicon nitride etching stopper layer 38 in Figs. 50 and 51; also see [0295]).

Therefore, it would have been obvious to one of ordinary skill in the art to make the semiconductor structure of Koga with the first layer being formed of silicon nitride and/or with the mask layer being formed of a silicon oxide, per the teachings of Witek and/or Noguchi, so that a semiconductor structure with desired material choice for the first layer and/or the mask layer would be obtained, since it has been held that:

The selection of a known material based on its suitability for its intended use supported a prima facie obviousness determination in *Sinclair & Carroll Co. v. Interchemical Corp.*, 325 U.S. 327, 65 USPQ 297 (1945).

Furthermore, it is noted any potential process implications associated with the above collectively taught structure would be regarded as process limitations. However, such process limitations would not carry patentable weight in the claims drawing to a structure, because distinct structure is not necessarily produced. In re Thorpe, 227 USPQ 964, 966 (Fed. Cir. 1985).

Response to Arguments

7. Applicant's arguments with respect to the above rejected claims have been considered but are moot in view of the new ground(s) of rejection.

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Conclusion

8. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Shouxiang Hu whose telephone number is 571-272-1654. The examiner can normally be reached on Monday through Friday, 8:30 AM to 5:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Lynne Gurley can be reached on 571-272-1670. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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PRIMARY EXAMINER